Attenuation to a program

The Marconi Programmable Attenuator Model 2163/1M2 marks a new step forward in remote operated attenuators. As a design concept, this attenuator offers some interesting considerations. For example, it does not use rotating switches or turrets, it is BCD operated in a 1, 2, 4, 8, 10, 20, 40, 80, sequence and it is effectively 'MAKE BEFORE BREAK' in operation.

The basic building block is a manually operated attenuator Model 2163 having a 140dB range in 1db steps and a frequency response from DC to 1000MHz. Programming this attenuator was simplified by careful selection of attenuation method; choosing pads of certain values enabled a total range of 139dB to be obtained using only ten pads.

Internally two die castings contain the attenuation pads and in the programmable form, ten actuating solenoids operate microswitches in each Pi pad and are mounted immediately above the main die casting. In this way mechanical travel has been reduced 0.025″ for each solenoid dramatically increasing MTBF.

To select interface conditions is always a problem. The Model 2163/1M2 is designed to be operated by levels corresponding to "O" = Ov ±3v; "1" = +12v ±3v (attenuation called) into an impedance of 22Kn. By altering taps on the logic board the opposite polarity (i.e. "1" = —12v ±3v) can be accommodated at a reduced input impedance of 2.7Kn.

The unit logic consists of a diode matrix driven by amplifiers and inverters which decodes functions 1, 2, 4 and 8. This information is then passed to an encoding matrix selecting the proper pads to form the attenuation units required. The output from the encoding matrix is passed to a transistor switch allowing current to flow in the appropriate solenoid coil, actuating the microswitch and bringing in the pad.

The tens logic consists of three OR gates and an AND gate the outputs being fed via transistor switches to the appropriate solenoid.

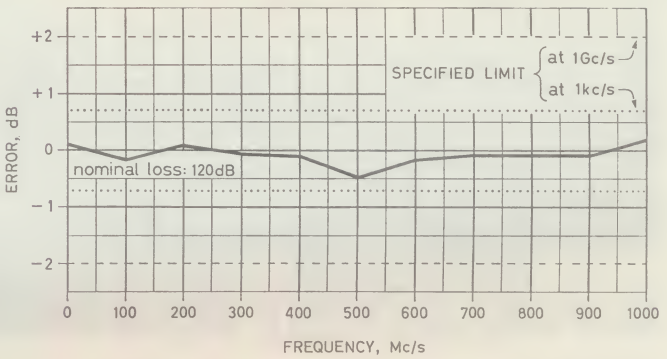
A special feature of the logic is that at no time during selection does the attenuation fall below either the initial or final value thus giving a "MAKE BEFORE BREAK" effect. In the logic this is accomplished by causing the 'MAKE' process to be fast with respect to the 'BREAK' process.

The result is a compact reliable Programmable Attenuator containing its own logic, having a setting speed of less than 100mS, a programmable range of 139dB in 1dB steps and a frequency response to 1000MHz. Insertion loss is 0.35dB/100MHz; alternatively, a pulse of zero rise time would acquire a rise time of 0.4nSec after being passed through the attenuator.

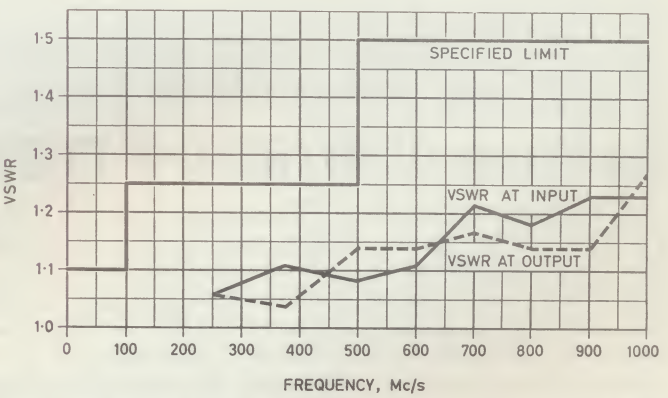
For automated testing with either sine or pulse signals, Model 2163/1M2 is an ideal systems component combining speed, convenience, compactness and moderate cost.

MANUALLY OPERATED Model 2163— $535

PROGRAMMABLE ATTENUATOR Model 2163/1M2—$1395



Typical attenuation performance at 120 dB. The wider claim above 100 dB insertion allows for the progressively worsening discrimination and accuracy of the available test gear rather than any deterioration in the performance of the attenuator itself



Worst v.s.w.r. performance of a typical attenuator for any combination of the fine and coarse attenuators

MARCONI INSTRUMENTS
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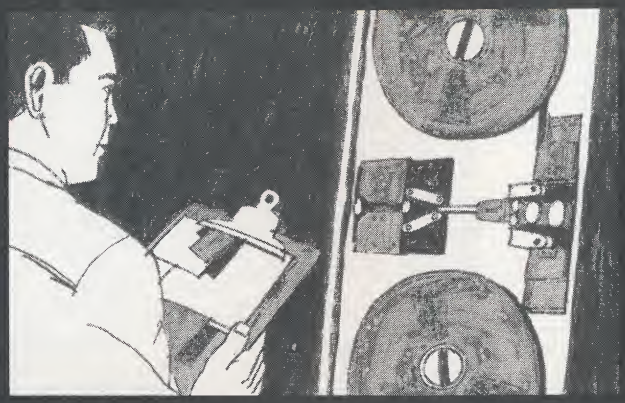
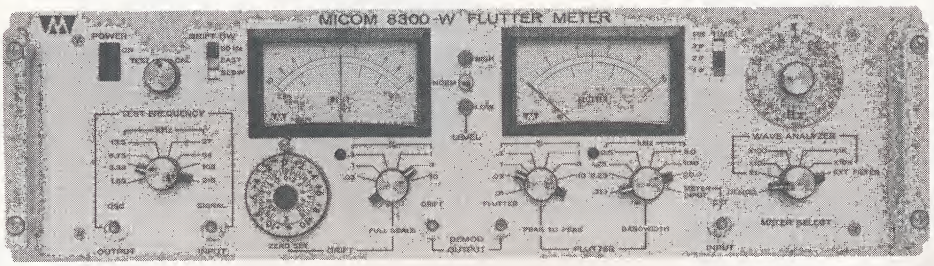


How much trouble are you having with flutter and drift?

Here's the only sure way to find out...



the Micom 8300/8300-W IRIG Flutter Meter

This solid-state instrument provides direct drift and flutter measurement with constant 2% accuracy... an accuracy never before possible. Measurements are read out simultaneously on separate front-panel meters, drift from ±0.03% to ±10%; flutter from 0.01% to 10% peak-to-peak.

The 8300/8300-W is available with all IRIG recommended frequency ranges. Peak-to-peak flutter is automatically measured to a 2 σ limit (random peaks occurring less than 5% of the time are excluded). Peak-to-peak flutter to a 1 σ limit (peaks less than 32% of the time are excluded), and peak-to-peak flutter to a 3 σ limit (peaks less than 0.3% of the time excluded) may also be measured.

This high-performance measuring tool is self-calibrating, making it trouble-free and easy to use. The operator just selects the range and reads the measurement. Sensitive enough for precise lab work, easy enough to use on the production line.

Why not put the Micom 8300/8300-W to work for you...

Contact Micom for more information.

MICOM

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MICOM, INC.

A comparatively new field of instrumentation is now being represented by **L & M Associates.** A comprehensive series of Drift and Flutter Meters is now offered by **MICOM, INC.** These instruments are designed to perform in accordance with the NAB, DIN, and IRIG Standards for the measurement of flutter. As a special feature the instruments can also be supplied with a built-in wave analyzer for the determination of drift frequencies. Complete catalog information will be supplied upon request.

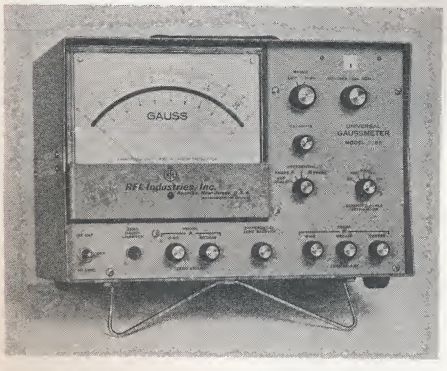
MCS CORPORATION

L & M Associates is pleased to announce it has been appointed representatives for the **MCS CORPORATION. MCS** (Microwave Components & Systems) offers a complete line of waveguide and other microwave components from 3 to 90 GHz. Catalogs will be available shortly for those customers who desire copies.

RFL INDUSTRIES, INC.

Have you ever seen a gaussmeter with these features?

1) Measures absolute flux density.
2) Measures differential or gradient flux.
3) Measures incremental variations to 1 PPM.

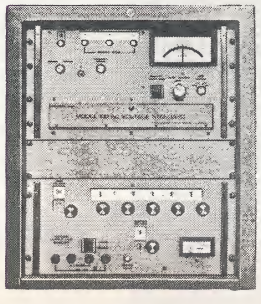


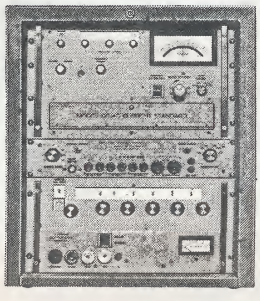
If such an instrument would solve some of the problems that you now face, we suggest you look at the new **RFL INDUSTRIES** Model 3265 Gaussmeter. A new 26 page technical brochure entitled **"How to Magnetize, Measure and Stabilize Permanent Magnets"** by **Jack Janicke** is available on request. Ask for it!

1+1=3

...when You Calibrate AC Voltage, Current **and Power** with these TWO RFL Standards

Model 100 Voltage Standard





Model 100 Current Standard

The Model 100 System is the only AC Standard available which provides a complete calibration facility for voltage, current and power.

Unequalled Flexibility — Either the voltage or current unit may be purchased and used *independently*. The other may be added and interconnected at any time for complete AC wattmeter calibration at power factors from 0 to 1.

Wide Range — The all-solid state system supplies ultra-precise, sine wave emf from 1 mV to 1000 V at frequencies from 50 Hz to 10 kHz and current from 1 mA to 50 A at frequencies from 50 Hz to 3 kHz.

Precision Accuracy — Long term accuracy (one year), traceable to NBS better than .04%. Stability better than .01%. Resolution practically infinite.

Automatic Operation — Set digital dials and read directly, *only* instrument under test.

Saves Time — Direct reading of output deviation is a special feature which eliminates calculation of full and downscale percent error.

Other Features — Safety interlocks protect operator and equipment under test. Built-in Standard Cell plus zener working source. Panel meter indicates burdens to 20 VA. Optional 10-line code for digital printout.

Phone Jack Janicke (201) 334-3100 for engineering evaluation loan or demonstration without obligation — or write for detailed specifications.

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